LOGICAL TRANSACTION ANALYSIS

BY

GEORGE BUEKER McCOWEN

B. S., University of Missouri, 1920
A. M., University of Chicago, 1927

AN ABSTRACT OF A THESIS

SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE OF DOCTOR OF PHILOSOPHY IN ACCOUNTANCY
IN THE GRADUATE SCHOOL OF THE UNIVERSITY
OF ILLINOIS, 1940

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LOGICAL TRANSACTION ANALYSIS

INTRODUCTION

Teachers of every subject realize that a good beginning is of vital importance to the student. The reason for this lies deep in the learning process, and search goes on unceasingly for the best methods of introducing students to the various fields of knowledge.

The particular purpose of this study is to explore the possibilities of a new approach to the teaching of elementary accounting on the college level. It is not itself an experiment. Rather, it is the blue print and specifications for an experiment which would require several years and the cooperation of many teachers to carry out. It involves more than an alternate procedure, for it deals with the fundamentals of the learning process.

Recent developments in accounting, business, government, and educational psychology, such as the following, combine to justify a study which attempts to appraise the present status of elementary accounting instruction:

1. The growing emphasis upon the profit and loss statement rather than the balance sheet.

2. The continued industrialization of business combined with improvement in cost accounting and the use of accounting as a device for managerial control.

3. Recent governmental legislative acts which seek to use accounting as a social control device, replacing somewhat free competition in that respect.

4. Recent theories and studies in psychology, especially the Gestalt theory of learning by wholes, call for a reappraisal of all methods of teaching.

Revision of our ideas with respect to elementary accounting instruction along the lines to be studied was first suggested by A. C. Littleton in the March, 1931, ACCOUNTING REVIEW under the title of "A Cost Approach to Elementary

Bookkeeping." And acting upon the suggestion therein, R. H. Eaton reported success with lectures based upon a cost approach. (December, 1933, ACCOUNTING REVIEW). This thesis continues the study of possible revision of methods by making a critical examination of past and present methods in light of the present status of the psychology of learning and fundamental accounting theory. It also develops a proposed sequence of presentation, and presents arguments in support thereof.

It is recognized that use is the only pragmatic test of any proposed approach, but it has not been attempted in this case, partly because of the time element and partly because the proposed approach involves more than a mere matter of alternate procedure which can be tested by a single use. The possibility of presenting the approach to teachers for criticism was considered and abandoned because of the difficulty of compressing the approach into a suitable form for distribution, and because such procedure might seem to be an imposition upon the teachers to whom it would be presented. For these reasons it was decided to build the case on reasonableness, observation based upon sixteen years of teaching experience, trends observed in the historical study, and the "laws of learning."

It is evident, therefore, that the study is not quantitative. It is qualitative. It attempts to build upon the best in the past and present, and to build in harmony with the theories of educational psychology. The arguments in its support rest, in part, upon the notion that accounting, at the university level, should be taught as something more than a clerical routine. Accounting instruction on the college level should be educational in the general sense; it should stimulate the intellectual processes, and develop the powers of logical reasoning. Rightly taught, accounting is an excellent medium for mental discipline.

The approach later proposed rests upon several conceptions: that accounting is an analytical record of the flow of assets through a business enterprise, prepared in such a way that the enterprise income on a bargained price basis may

be calculated as a test of managerial skill and judgment; that accounting is an attempt to show the relation of managerial effort and accomplishment; and that accounting is a method of thinking about business activity and a basis for reasoning about business affairs.

It should be emphasized that the approach here favored is strictly an approach—a slow development of basic ideas and relationship—so that transaction analysis (the heart of "keeping books" and the foundation of advanced work in accounting) may, in the student's later work, be developed along lines which, while varying somewhat from the usual transaction analysis basis of the balance sheet, will make this phase of accounting easier understood and more logical.

The thesis is divided into three parts. Part I consists of a survey of the psychological foundations of learning and an historical and critical survey of past and present methods of introducing students to elementary accounting. Part II outlines a proposed approach built upon the findings of the survey. And part III presents arguments in support of the proposed approach together with conclusions based upon observed trends in teaching methods as revealed in part I.

The historical study was made directly from published books on accounting, supplemented by histories of accounting and periodical articles. The psychological foundations were found in books and periodical articles on educational psychology. Books and articles dealing with accounting theory, income theory, and the measurement of incomes were the source of the conception of the structural whole of accounting, i. e., the flow conception of accounting already mentioned.

PART I.

CRITICAL SURVEY

Part I is a study of the psychological foundations of learning and an historical and critical survey of methods used to introduce students to the study of accounting from 1494 to date. In general, the criterion upon which the criticism is based is found in the psychological "laws of learning," includ-

ing economy in learning and the Gestalt theory of structured wholes. However, other arguments based upon the changing uses of accounting and its fundamental purpose are not ignored.

A survey of such parts of psychology as are applicable to teaching revealed general agreement upon the following points germane to learning at the college level. First, the "reaction hypothesis" bases all learning upon the proposition that learning is a form of activity based upon a response to an external or internal stimulus.[1] Second, each reaction to a stimulus conditions the nervous system to such reaction so that there is a tendency to repeat the reaction when the stimulus again recurs—the law of use and frequency. Third, time undoes the conditioning process and the longer the lapse of time since a certain stimulus-response situation occurred the more one forgets—the law of disuse and recency. Fourth, a response which gives a feeling of satisfaction is more likely to be repeated than one which caused annoyance—the law of effect.

Experimentation has revealed, also, certain other propositions which lead to economy in learning. The most important are:

1. Logical material is learned more rapidly than material which is not logical.

2. Distractions from the associations desired to be made should be avoided.

3. Students who are given a theory background adjust themselves to new situations more readily than those who learn by trial and error.

4. Learning proceeds best from a broad, vague, and indefinite total to the particular and precise detail, i.e., from wholes to parts.

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1. A common stimulus is the tension set up in the student when confronted with a problem. The problem is not a whole. The student's reaction is to complete the whole, and when this is done the nervous system is placed in equilibrium and the tension is released.

Points numbered one and four, above, are closely related. They are considered by many to be more than a mere matter of economy of learning. Some authorities consider them to be the basis of all learning on the level of reflective thinking.

A whole seems to have three primary qualities. (1) It is definitely segregated from other wholes. (2) It possesses unity built around a central function, and has its own internal dynamic relations. (3) It is more than the sum of its parts; it is a rational and logical structure.

Learning is more than memory; insight is the keynote. The whole-method of learning leads to better insight because the relationship between parts is more easily discovered.

The whole-method is more adapted to adults than children. It is more economical when used with continuous, meaningful, logically related materials. It is, therefore, especially adaptable to students at the college level.

Finally, psychologists now favor an approach which starts with induction and reaches deduction somewhat later, because there must be some understanding of particulars before generalities can be understood.

The above ideas give the following leads to be used in criticising any approach and in any attempt to construct a new one.

First, find the structured whole, which must be definitely segregated, will possess unity built around a central function with decisive internal dynamic relations, and be a rational structure. The writings of many of the leading accounting theorists lead us to believe that the structured whole of accounting for a business enterprise is a record of the flow of assets through that enterprise analyzed in such a way as to calculate enterprise income.

Second, avoid early distractions which may lead to undesirable associations. The principal distractions to be avoided here are the association of expenses and incomes with net worth instead of with assets where they belong. They belong with assets because they are measures of certain kinds of

asset increases and decreases. We should avoid also the too early idea of balance, because such idea distracts from the theory of income calculation by focusing attention upon the mechanics of bookkeeping.

Third, develop attention factors. This can be done in accounting by basing the presentation upon the dynamic idea of flow, thus using the attention factor of motion.

Fourth, make the sequence of presentation more logical. The more logical the material, the more rapidly it is learned.

Fifth, give prior attention to induction in building up the idea of the real nature of accounting—the generality.

The heart of accounting theory is the classification of accounts whereby income is calculated; the core of accounting practice is transaction analysis which involves the determination of the accounts to be debited and credited and the amounts thereof. An approach to the teaching of accounting, therefore, must lay a logical foundation for account classification and transaction analysis.

Paciolo and his immediate followers for a hundred years used a clerical procedure approach. Accounting theory was not considered. The approach was wholly inductive. The next two hundred years were marked with emphasis upon rules, many of which were based upon the personification of the impersonal accounts. Personification is a type of theory, and the use of rules is evidence of the failure of the theory to give understanding.

The emergence of the theory of accounting as a statistical device for measuring enterprise income may be dated around 1841-1855, with the writings of Thomas Jones. But his leads were not followed until accounting became a subject for university instruction. This, however, is evidence of a shift in theory to a mathematical basis. But a mathematical theory does not relate accounting to the business activity of which it is a reflector. Sprague (1907) and Hatfield (1909) folowed Jones' lead, and Kester (1917) achieved the balance sheet approach.

The balance sheet approach is recognizable as an attempt to start accounting instruction with the conception of a whole which relates accounting to its administrative use and especially its financial use. However, it appears that an end result was seized upon as the basic theory, generality, or structured whole. But this end result is not a satisfactory generality or whole, because it fails to reveal the internal dynamic relationships existing in a productive enterprise in action.

The balance sheet approach is a deductive approach. But accounting is too involved for a deductive approach without some prior induction. The nature of accounting first must be built up by showing the relation of accounts to the activities of the enterprise—an inductive approach. The student is not ready for the generality before he sees this relationship.

The balance sheet approach introduces distracting complexities which make the problem of associating expenses and incomes with assets almost impossible. Also, the early idea of equilibrium which it uses gives to accounting a mathematical structure which makes it appear as a game of debits and credits instead of a problem in the measurement of enterprise income.

But the emphasis then being placed upon accounting as a financial aid rather than an administrative device made the balance sheet approach a logical development of its time. It was immensely superior to its forerunners. It is still good. To one who already understands accounting it is the most logical starting point yet devised. But is it the best approach for one who has had no previous training in the subject and therefore is not prepared for the complicated generality of the balance sheet?

PART II.

PROPOSED APPROACH

The historical and critical survey revealed weaknesses in accounting instruction which, it is believed, may be overcome by constructing an approach which is a better application of

the laws of learning, and more in accord with the nature of accounting. The approach should be characterized by an emphasis upon theory instead of upon accounting procedure, because experiments have shown that students with a theoretical background adapt themselves more easily to new situations than those who learn by trial and error, or memorizing procedures. Also an approach which emphasizes theory is more in keeping with instruction at the college level, and more adaptable with the "laws of learning."

The proposal given is not in any sense textual material. Instead, it is an attempt to explain to the reader the sequence of presentation, and the type of discussion and illustrations suitable for presentation to students—suitable for building a basis for understanding the complex generality of accounting.

The details of the approach itself cannot be given in this brief summary. But the sequence of chapters, followed by a brief discussion of each, is given below. The chapter numbers refer to the chapters of the proposed approach rather than to chapters in the thesis.

Chapter

I. Assets
II. Cash and Cash Outlays
III. The Internal Conversions
IV. The Asset Diminutions
V. Income and the Statement of Profit and Loss
VI. Accounting when the Credit System is the Source of Assets
VII. Mercantile Accounting
VIII. Transaction Analysis.

The theory of assets should be developed upon a price basis rather than upon a value basis. The asset accounts are records of price aggregates rather than present values, and the use of subjective values has no place within the scheme of double-entry debits and credits. From a price-income viewpoint, assets are unused costs, uncommitted costs, or delayed receipts.

Assets may be explained as representing services. All services which come within the sphere of influence of the

business enterprise during a period of time and are necessary for income calculation are assets of the business during that period of time. The time-period concept lays a foundation for explaining expense and income accounts as measures of certain asset changes rather than as measures of certain net worth changes.

Assets may be defined as the services which have come within the sphere of control of the person, group of persons, or enterprise, whose accounts are being considered, and include (1) potential-services represented by various forms of cash not yet converted into specific services (bank deposits, marketable securities, etc.), and various forms of delayed receipt of cash (notes receivable, open accounts, etc.), as well as (2) specific service-forms wherein the use is made evident by the form (plant, inventories, etc.).

Cash and cash outlays, without consideration of the source of the cash, is chosen as the best place within the flow of assets through an enterprise to start the development of the theory that accounting functions primarily as an income calculation. Arguments supporting this choice are given in part III.

After introducing accounts and debit and credit, the student is carried through an illustration which shows cash outlays made from a cash fund. These are related to the idea of flow, and a flow chart is started.

Cash and the various assets secured by making cash outlays are explained. The explanation features the necessity of keeping the classification of assets in such a way that the amount of assets later used may be related to the income later produced. The explanation emphasizes, therefore, the differences underlying assets that are alike in structure but different in use.

These internal conversions emphasize very clearly the internal dynamic nature of business activity reflected in accounting. The flow concept started in the previous chapter is continued and strengthened. Unit costing is chosen as the medium of instruction because it uses a positive calculation of the amount of each asset consumed; therefore it features

income calculation rather than the value of the unconsumed asset. Costs are applied to goods in process on an historical cost basis, for an understanding of flow and business activity is desired rather than a knowledge of practical expedients. Effort is made to explain the internal conversions as one step in income calculation. The manufacturing statement concerns the cost aspect of internal conversions; so it is introduced at this point.

The asset diminutions which are next explained, are costs, expenses, and losses. The two previous chapters featured assets within the enterprise. This chapter explains the records made of certain assets passing out of the enterprise to outsiders. The flow chart is continued, of course, and the separation of the assets into those within the enterprise and those passing to outsiders gives definite association of costs, expenses, and losses with assets.

Income is the next concept to be introduced. This is shown to be a source of new assets—the result of the costs and expenses already explained. The costs and expense accounts measure effort (services used); the income accounts measure accomplishment (service given).

At this stage the background for understanding the profit and loss statement has been laid; therefore that statement is illustrated and explained.

But the credit system modifies somewhat our conception of sources of assets, including income sources. These modifications are next introduced and explained. The chief problems of an income theory other than the time-period problem lie in the credit system. Where in the credit system do asset increments stop and anticipation start? With the introduction of the sources of assets, the entire picure of accounting is sketched. The student is then ready for the balance sheet; so that statement is illustrated and explained.

The introduction of sources completes the record of the flow of assets through an enterprise. The completed flow chart features all sources on the left side of the chart, followed next by assets, and finally by asset diminutions. The flow

equation, which is the equation of the ledger rather than the equation of the balance sheet, is shown to be:
Capital + Liabilities + Income=Assets + Expenses + Losses

Capital, liabilities, and income are the sources of assets. The assets, expenses, and losses may be collectively termed dispositions. Hence the flow equation may be expressed: Sources=Dispositions. We are more accustomed to think of this equation in reversed form:

Dispositions = Sources

(Left side of trial balance) = (Right side of trial balance). But in this latter form the flow concept is not evident, because we read from left to right and think of a normal flow as running from left to right.

The chapter on mercantile accounting serves as a review and as an application of the theories developed. It affords also a medium for pointing out some expediencies frequently necessary in practice.

The preceding chapters lay the groundwork for an understanding of transaction analysis, which is the last chapter in the proposed approach. The cost-flow concept is there preserved by basing transaction analysis upon the equation of flow, Sources = Assets + Expenses + Losses. This preserves the dynamic conception of accounting which is featured in previous chapters.

Instruction from this point on would be along the usual lines of modern accounting texts: drill on transaction analysis, entering transactions in journals of various kinds, posting, etc. (using problems and short sets) and the gradual introduction of bookkeeping mechanics and varieties of accounts and statements.

PART III

ARGUMENTS SUPPORTING THE COST FLOW-APPROACH

The manufacturing enterprise was chosen as the vehicle best suited to lay a theory foundation for accounting because

the internal dynamic business activities are there magnified so that the student can see activity centered around assets as the essence of productive activity. Mercantile and service accounting feature transactions with outsiders, and do not show so clearly the productional aspects of business. By directly calculating the amount of assets used instead of finding the amount used indirectly by the inventory method, manufacturing accounting features cost prices, a desirable thing to keep in mind when thinking about income calculation. It also features the flow of assets through an enterprise, a conception of accounting which is more basic to income theory than a mathematical equation of assets and rights.

Many writers in the field of accountancy stress the managerial use of accounting data as being the most comprehensive of all the uses which accounting must serve. For the most part management directs the internal activities of an enterprise. It is responsible for the activities which give rise to expenses and incomes. The costs of such activities are the most controllable features of business. It is desirable, therefore, to lay down a sound conception of the nature of cost and expense in the minds of all who study accounting. This can be done with factory accounting because factory accounting places a maximum emphasis upon logic and a minimum emphasis upon law and finance.

And, for the reasons above outlined, factory accounting is a better picture of the structured whole of accounting than other types. The summary of an end result (such as the balance sheet) shows only the goal. The activity necessary to reach that goal is a necessary part of the structured whole.

One of the weakest points, it may be noted, in the balance sheet approach is the way it associates expenses and incomes with net worth. The use of manufacturing accounting in the teaching approach, coupled with the omission of any consideration of equities until income calculation has been developed, enables the student to see expenses and incomes as phases of assets instead of phases of net worth.

Manufacturing accounting coordinates accounting with economics better than other types of accounting. The prob-

lems of economics which deal with the measurement of capital and income have their counterpart in any enterprise, but they are more clearly evident in the factory organization, especially the problem of physical production which is the essence of economic income (wealth increment theory).

The increasing use of accounting as a social control device, such as is evidenced by the Robinson-Patman act which prohibits price discrimination between customers and leads to a study of costs, emphasizes the necessity of laying down a sound idea of cost in the first course in accounting so that all who study the subject may understand the strength and weakness of the use of accounting for social control purposes.

The advisability of increased instruction in theory matters was indicated when the psychological "laws of learning" were discussed. When accounting is introduced on the college level this seems especially desirable. It is not there being taught as a trade; it is being taught as a basis of a profession and as a mental discipline. The history of accounting instruction in universities shows a definite trend toward the use of more theory. Sprague's PHILOSOPHY OF ACCOUNTS and Kester's balance sheet approach were definite and successful efforts to raise the level of instruction in accountancy by giving the student a better theory background.

Granting that more and better theory is advisable, where is the proper place to start? There are rather good arguments in favor of starting with assets. Assets are the basic data in every accounting system, as they are basic elements in economic productivity; all accounts tell something about assets. Assets are objective and therefore more understandable. The student is already acquainted with many of them in their simpler aspects; it is good pedagogy to begin with those ideas with which the student is familiar, because the mind can grasp and use new ideas only in terms of past experiences. And since expense and income accounts are measures of certain asset changes it is well to develop a conception of assets before introducing changes in assets.

All assets pass, eventually, through the cash account. Cash is service in an uncommitted state; it stands midway between

the income assets and outlays for services. Cash outlays represent the first judgment made by management in the production of income. Cash appears to be the most suitable place to initiate the underlying idea of cost and expense because cash outlay is the first step in incurring cost and expense, i.e., it is the first productive activity of a non-promotional nature.

From a flow chart basis, there appears to be some argument in favor of starting with sources, because in a logical flow chart sources appear first. Sources, however, are subjective ideas and it seems advisable to keep other subjective ideas in the background until the two foremost subjective ideas of expense and income have been developed, i.e., until the income calculation has been explained.

If a flow chart is logical, the next step in income calculation must be the internal conversions, and after that, the asset diminutions (costs, expenses, and losses). This completes the assets-expense association. Conflicting ideas and distractions have been avoided; it should therefore be easier for the student to grasp the direct forceful presentation of the subjective idea of cost and expense accounts as measures of asset diminutions of certain kinds.

Income, the accomplishment which arises out of the dust of costs and expenses, must be the next subject introduced. The income accounts, too, must be related to assets since they measure certain increments in assets.

Now the income calculation on a cash basis has been completed. But the credit system affords a substitute for cash; its effect upon the income calculation must be noted. The credit system changes the income calculation from a completed transaction basis to an accrual basis, i.e., a service used and service-given basis. This is the logical place to introduce accrued items, since accounts receivable and accounts payable are the basic accruals. The credit system explains, likewise, the source of the assets originally invested in the enterprise. All assets have a source and a destination; so the equation of flow, which is the equation of the ledger, is introduced at this point.

With the above development behind him the student is prepared for "logical transaction analysis" based upon the dynamic idea of accounting as a record of a segment of the flow of assets as they pass through a business enterprise, analyzed in such a way as to measure as accurately as possible the enterprise income on a bargained price basis.

The use of the flow chart may be defended upon psychological grounds. It increases perception, and perception is closer to the objective situation than thinking. The first step in problem solving is a rearrangement of the perception field into new patterns.

In conclusion, the proposed approach is adaptable with the psychological "laws of learning." It develops the structured whole of accounting, which is, according to leading theorists in accounting, a calculation of enterprise income. And this is done by the inductive process favored by many psychologists. Distractions are avoided until the desired concepts have been completed. The dynamics of the flow conception aids in securing attention, which leads to interest in the subject and sets up a tension which drives the student into the active process of learning.

The proposed approach is an extension of a trend observed in educational psychology and in the history of accounting instruction. The older school of educational psychology bases learning upon S-R (stimulus-response) bonds stamped in and out in accordance with the laws of use, disuse, and effect. It is an inductive theory of learning. Starting about 1890 a new school emphasized structured wholes as the basis of learning—a deductive theory of learning. Lately some educators are advocating that the S-R bonds build up a generality and that the generality then becomes the basis for insight and the reasoning process.

The history of accounting instruction reveals a similar trend. Paciolo's clerical procedure approach was purely inductive. Personification is recognizable as a master-servant theory or structure of accounting. But the growth of numerous rules indicates the failure of this conception of accounting to lead to insight. Thomas Jones, Sprague, and Hatfield shift-

ed the basis of accounting theory to the equation, Assets= Liabilities + Net Worth. Their structured whole is seen as a mathematical equation. Finally Kester improved the structured whole concept by beginning with the goals of the accounting process: the end-statements.

The proposed approach is a continuation of the search for a structured whole—a continuation of a trend. It is an attempt to build this whole by the slow process of induction so that the generality will be understood when it is finally reached. This generality—accounting as a flow of assets through an enterprise analyzed in order to calculate income—is a solid foundation for deduction, which leads to insight and reasoning.

But it should be noted that the benefits derived from the cost-flow approach lie as much in the student's later work as in the approach itself. A background of theory is built up to which he can refer in later courses, and which will aid him in making adjustments to new situations. It unifies accounting and gives it a central logical core, for the flow conception of accounting is universal to all types of accounting.

VITA

George Bueker McCowen was born at Columbia, Missouri, on November 8, 1895. He attended the public schools at Columbia, Missouri, until 1915. Then followed two years at the University of Missouri, eighteen months in the army, and two more years at the University of Missouri. The degree of bachelor of science in business administration was conferred by the University of Missouri in 1920. A year as secretary of the Taylor Music Company, Inc., Columbia, Missouri, was followed by a year as instructor in accounting at the University of Arkansas, a summer school at the University of Chicago, a year as instructor in accounting at the University of Akron, and a year of study at the University of Chicago. Three years (1924-27) were spent as assistant professor at the University of Wyoming. The degree of master of arts in accounting was conferred by the University of Chicago in the summer of 1927. Since 1927 he has been assistant professor and associate professor at the Oklahoma Agricultural and Mechanical College, Stillwater, Oklahoma, except for one year and two summers spent in residence at the University of Illinois.